WE CLAIM:

1. A power generation system for an aircraft having an engine and an AMAD, comprising:

a power take off shaft that transmits a rotational mechanical power from the engine;

a power producing device that converts a first portion of said rotational mechanical power to another form of power; and

an output shaft that transmits a second portion of said rotational mechanical power to the AMAD.

2. The system of claim 1, wherein said power producing device occupies a pre-existing unused volume in the vicinity of a pre-existing power take off shaft formerly connecting the engine to the AMAD.

3. The system of claim 1, wherein:

said power producing device is located on an opposite side of a bulkhead from the AMAD.

4. The system of claim 1, wherein:

said power producing device is installed in series with said power take off shaft, and

said power producing device is driven by said power take off shaft.

5. The system of claim 1, wherein:

said power producing device has an internal shaft;

said power take off shaft is connected to said internal shaft; and

said output shaft is connected to said internal shaft.

6. The system of claim 1, wherein:

said power producing device has an internal shaft;

said power take off shaft drives said internal shaft through a gearbox; and

said output shaft is connected to said power take off shaft.

7. The system of claim 1, wherein said output shaft is connected to the AMAD in the same manner as a pre-existing power take off shaft formerly connecting the engine to the AMAD.

8. The system of claim 1, wherein said power take off shaft is connected to the engine in the same manner as a pre-existing power take off shaft formerly connecting the engine to the AMAD.

9. The system of claim 1, wherein said system provides at least 25 kW of electrical power over a pre-determined range of engine speeds.

10. The system of claim 1, further comprising:

a second generator driven by a second power take off shaft wherein said system provides at least 50 kW of electrical power over a pre-determined range of engine speeds.

11. An electrical power generation system for an aircraft having an engine and an AMAD, comprising:

a power take off shaft connected to the engine and that provides rotational power from the engine,

an electrical generator that converts a first portion of said rotational power to electrical power; and

an output shaft connected to the AMAD that provides a second portion of said rotational power to the AMAD.

12. The system of claim 11 wherein:

said generator has an internal shaft connected to said power take off shaft and connected to said output shaft, and

said internal shaft is connected in series between said power take off shaft and said output shaft.

13. The system of claim 11 wherein said power take off shaft has a spline and said power take off shaft spline interfaces to the engine in a manner identical to that of a pre-existing power take off shaft formerly connecting the engine to the AMAD.

14. The system of claim 11 wherein said output shaft has a spline and said output shaft spline interfaces to the AMAD in a manner identical to that of a pre-existing power take off shaft formerly connecting the engine to the AMAD.

15. The system of claim 12 wherein a total length of said power take off shaft, said internal shaft, and said output shaft is the same as a length of a pre-existing power take off shaft formerly connecting the engine to the AMAD.

16. The system of claim 11 wherein

said generator has an internal shaft connected through a gearbox to said power take off shaft, and

said output shaft is connected to said power take off shaft.

17. The system of claim 16 wherein a total length of said power take off shaft and said output shaft is the same as a length of a pre-existing power take off shaft formerly connecting the engine to the AMAD.

18. The system of claim 11, further comprising:

a power control unit electrically connected to said generator wherein said power control unit provides at least 25 kW of electrical power over a range of 72% to 100% of engine speed.

19. A generator assembly for an aircraft having an engine and an AMAD, comprising:

a power take off shaft having a spline interface at an engine end of said power take off shaft;

an electrical generator having an internal shaft wherein said internal shaft is rotationally connected to said power take off shaft; and

an output shaft rotationally connected to said power take off shaft and having a spline interface at an AMAD end of said output shaft.

20. The generator assembly of claim 19 wherein:

said output shaft is rotationally connected to said power take off shaft via a first mechanical connection between said power take off shaft and said internal shaft and a second mechanical connection between said internal shaft and said output shaft, and

said internal shaft is rotationally connected to said power take off shaft via said first mechanical connection.

21. The generator assembly of claim 19 wherein:

said output shaft is rotationally connected to said power take off shaft via a mechanical connection between said power take off shaft and said output shaft, and

said internal shaft is rotationally connected to said power take off shaft via a gearbox.

22. The generator assembly of claim 19 wherein said generator assembly replaces a pre-existing power take off shaft formerly connecting the engine to the AMAD.

23. The generator assembly of claim 19 wherein:

said spline interface at the engine end of said power take off shaft matches that of a pre-existing power take off shaft formerly connecting the engine to the AMAD;

said spline interface at the AMAD end of said output shaft matches that of a pre-existing power take off shaft formerly connecting the engine to the AMAD; and

said generator assembly has a length between said spline interface at the engine end of said power take off shaft and said spline interface at the AMAD end of said output shaft equal to a length of a pre-existing power take off shaft formerly connecting the engine to the AMAD.

24. The generator assembly of claim 19 wherein:

said generator assembly fits in a space within the aircraft, a portion of which space was occupied by a pre-existing power take off shaft formerly connecting the engine to the AMAD; and

said generator assembly connects the engine to the AMAD.

25. The generator assembly of claim 19 wherein:

said power take off shaft provides a rotational power from the engine,

said electrical generator converts a first portion of said rotational power to electrical power; and

said output shaft provides a second portion of said rotational power to the AMAD.

26. The generator assembly of claim 19 wherein said electrical generator produces sufficient electrical power to provide at least 25 kW of electrical power over a range of 72% to 100% of engine speed.

27. An aircraft having an engine and an AMAD, said aircraft comprising:

a power take off shaft having a mechanical connection to the engine at an engine end of said power take off shaft, wherein said power take off shaft is rotationally connected to the engine, and said power take off shaft provides a rotational power from the engine;

an electrical generator having an internal shaft wherein:

said internal shaft is rotationally connected to said power take off shaft;

said electrical generator converts a first portion of said rotational power to electrical power; and

said generator fits in a space within the aircraft, said space located between the engine and the AMAD; and

an output shaft rotationally connected to said power take off shaft and having a mechanical connection to the AMAD at an AMAD end of said output shaft, wherein said output shaft provides a second portion of said rotational power to the AMAD.

28. The aircraft of claim 27 wherein:

said output shaft is rotationally connected to said power take off shaft in series via said internal shaft, and

said internal shaft is rotationally connected to said power take off shaft via a mechanical connection.

29. The aircraft of claim 27 wherein:

said output shaft is rotationally connected to said power take off shaft via a mechanical connection between said power take off shaft and said output shaft, and

said internal shaft is rotationally connected to said power take off shaft via a gearbox.

30. A method for providing auxiliary electrical power in an aircraft having an engine and an AMAD, comprising steps of:

rotationally connecting a power take off shaft to the engine;

rotationally connecting an electrical generator to said power take off shaft;

rotationally connecting said power take off shaft to the AMAD; and

using said power take off shaft to drive said electrical generator, providing electrical power.

31. The method of claim 30, wherein said step of rotationally connecting said power take off shaft to the engine includes connecting said power take off shaft to a pre-existing spline interface with the engine.

32. The method of claim 30, wherein said step of rotationally connecting said power take off shaft to the AMAD includes steps of:

rotationally connecting said power take off shaft to an output shaft; and

connecting said output shaft to a pre-existing spline interface with the AMAD.

33. The method of claim 30, wherein said step of rotationally connecting an electrical generator to said power take off shaft includes steps of:

mechanically connecting an internal shaft of said electrical generator to said power take off shaft; and

mechanically connecting an output shaft to said internal shaft and in series between said internal shaft and the AMAD.

34. The method of claim 30, wherein said step of rotationally connecting an electrical generator to said power take off shaft includes steps of:

rotationally connecting an internal shaft of said electrical generator to said power take off shaft via a gearbox; and

mechanically connecting an output shaft to said power take off shaft and in series between said power take off shaft and the AMAD.